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ABSTRACT

The various relationships of stress arousal and stress-prone personality traits to menstrual distress were investigated in order to quantify psychophysiological arousal differences between high and low menstrual distress symptom reporters and examine differences in stress-prone personality traits between high and low menstrual distress symptom reporters. College women (N=50) were blocked into two groups based on menstrual distress symptom prevalence: a high symptom report group (N=26), and a low symptom report group (N=24). Baseline and stress levels of heart rate, respiration rate, muscle tension, skin temperature, and skin resistance were taken on all subjects during the intermenstrual and critical menstrual cycle phases. A battery of stress-prone personality inventories was also administered including trait anxiety, locus of control, and type-A behavior pattern. Comparisons by ANOVA with repeated measures indicated that there were significant differences in baseline levels of heart rate, respiration rate, and skin temperature in women reporting high menstrual distress symptoms. Utilization of ANOVA with repeated measures revealed that heart rate and respiration rate levels were higher in the critical phase of the menstrual cycle, nonspecific to a symptom group. Comparisons by t-tests indicated significant differences in type-A behavior pattern, locus of control, with the high MDS reporters exhibiting more stress-prone traits than low reporters. (Author)

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THE RELATIONSHIP OF STRESS AROUSAL AND STRESS PRONE PERSONALITY TRAITS TO MENSTRUAL DISTRESS

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by

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THE RELATIONSHIP OF STRESS AROUSAL AND STRESS PRONE PERSONALITY TRAITS TO MENSTRUAL DISTRESS

One of the most pervasive but least studied stress-related problem concerns the cluster of symptoms known as Menstrual Distress Symptoms (MDS). MDS are defined as a comprehensive set of self-reported symptoms related to the cyclical variations in the menstrual cycle including somatic, affective and behavioral components in the absence of gross pathological conditions. It is well known that many menstruating women experience fluctuations in mood, symptoms and behavior which occur in direct conjunction with the phases of the menstrual cycle. The prevalence and severity of MDS has been shown to be quite high even in populations of apparently normal young women. Estimates of women experiencing these undesirable symptoms range in the literature from 30-95% of the human menstruating population.

A number of research endeavors have attempted to identify the various physiological, affective, cognitive and behavioral changes associated with the menstrual cycle. The most comprehensive study conducted regarding the identification of MDS components was undertaken by Moos and associates in the development of his Menstrual Distress Questionnaire (1969). Moos, et al. (1969) identified seven symptom groups through a factor analysis of responses from over 800 menstruating women. These symptom groups, reflecting the major components of MDS, are presented in TABLE I.

In considering the comprehensiveness of these symptoms it is clear to see the complexity of Menstrual Distress Symptomology and the inherent research problems it presents.

However, the question of whether womens' responses to menstruation stem primarily from biological or from social and psychological factors has not been resolved as the exact etiology of MDS is unclear. Isreal (1967) and Paulson

and Wood (1966) suggest that there is general agreement that a combined psychosocial and physiological approach should be considered and evaluated in regard to MDS because of the cultural, social and emotional taboos linked with menstruation.

Recent literature has strongly supported a psychosomatic interaction between MDS and psychophysiological stress arousal, as the mechanisms regulating both the human menstrual cycle and stress arousal inherently involve the interaction of the endocrine and central nervous systems, and are both affected by general health status.

Another component of the psychosomatic concept is concerned with perception in which personality traits may play a major role. Since the monumental research of Friedman and Rosenman (1960) which identified personality factors which contributed to coronary heart disease via stress arousal, researchers have been prompted to search for contributory personality factors in suspected psychosomatic conditions. It has been suggested that psychological processes inherent in specific personality factors may be related to menstrual distress symptomology. Moos (1969) reported that women who had significant Menstrual Distress Symptoms (premenstrually and menstrually) were also likely to exhibit anxiety, aggression and depression in all phases of her cycle. His findings were consistent with Coppen and Kessel's (1963) who reported that women who complained of premenstrual irritability were more likely to be irritable at other times in the cycle as well. These studies raise the possibility that personality traits may be closely related to MDS, which is not inconsistent with psychosomatic concept of health and disease.

Medical treatment for MDS has generally involved attempts at reducing the symptoms as they occur or at least trying to reduce the related psysiological and emotional discomfort. Recent advances in psychosomatic medicine indicate

that the most effective treatment for disorders thought to have a high degree of psychosomatic involvement is to intervene at a social-psychological level, thus reducing subsequent stress arousal. However, before this can be applied to MDS it is necessary to establish the extent to which stress-prone personality traits and psychophysiological stress arousal actually contribute to the problem.

The purpose of the present study was to examine the various relationships of stress arousal and stress prone personality traits to menstrual distress. Only preliminary analysis has been completed which consisted of comparing differences in selected psychophysiological stress parameters and selected stress-prone personality traits between high and low MDS reporters.

The population used in this study consisted of college-age female volunteers from a large Mid-Atlantic University who met the following criteria: Reporting regular menstrual cycles; not currently using oral contraceptives; nulliparous; not currently involved in therapeutic modes to alter their menstrual cycles; not formally trained in relaxation techniques; and have been screened for gross pathological conditions of their pelvic organs. These volunteers formed a subject pool and were administered the Menstrual Symptom Questionnaire developed by Tasto and Chesney (1975), under the title of Menstrual Cycle Evaluation form. Based on their responses on this instrument all volunteers were stratified into either a high or low symptom report group. From the pool of each category, 30 subjects were randomly assigned to participate in this experiment. Twenty-six high symptom reporters and 24 low symptom reporters completed this study. Their Menstrual Questionnaire scores are presented in TABLE II. The dropouts in this study were due to pregnancy, influenza, and scheduling problems.

Each subject was required to participate in data gathering lab sessions during both their critical and intermenstrual cycle phases of two menstrual cycles. The intermenstrual phase was designated as day 9-14 of the subjects

menstrual cycle and the critical phase was designated as the first day of menses plus or minus 2 days. During each laboratory session five psychophysiological stress parameters were measured concurrently: heart rate, respiration rate, muscle tension, skin temperature, and skin resistance. During a separate session a battery of personality inventories was administered which included measures of the following constructs: trait anxiety (Spielberger, 1970), type-A behavior pattern (Friedman and Rosenman, 1960) and locus of control (Rotter, 1966).

To assess the relative differences between high and low MDS reporters regarding the psychophysiological stress parameters, a 2 x 2 factorial analysis of variance with repeated measures was utilized, with symptom report group as one factor and the menstrual cycle phase as the repeated factor. To assess the relative differences regarding the stress-prone personality traits, t-tests were utilized. All tests of significance utilized an alpha level of .05 due to the nature of this exploratory study.

The results of the 2 x 2 ANOVA regarding heart rate indicated significant main effects for both factors with no significant interaction (TABLE III). The marginal means for the significant cycle phase factor are presented in TABLE IV. These results indicated that the subjects exhibited higher heart rates during the critical menstrual cycle phase, regardless of symptom report group. The marginal means for the significant symptom report factor indicated that high symptom reporters exhibited stable elevations in heart rate regardless of cycle phase (TABLE V).

The results of the 2 x 2 ANOVA regarding respiration rates paralleled those for heart rate, indicating significant main effects for both factors and no significant interaction (TABLE VI). The marginal means for the significant cycle phase factor are presented in TABLE VII. These results indicated that the subjects exhibited higher respiration rates during the critical menstrual

cycle phase, regardless of symptom report group. Marginal means for the significant symptom report group (TABLE VIII) indicated that high symptom reporters exhibited stable elevations regarding respiration rates as compared to low reporters regardless of cycle phase.

The results of the 2 x 2 ANOVA regarding muscle tension (TABLE IX) indicated no significant main or interaction effects.

The results of the 2 x 2 ANOVA regarding skin temperature indicated a significant main effect for symptom report group with no significant effect for cycle phase or no interaction effect (TABLE X). Marginal means for the significant symptom report factor indicated that high MDS reporters exhibited significantly lower skin temperature than did low MDS reporters, regardless of menstrual cycle phase (TABLE XI).

A significant interaction effect between symptom report and menstrual cycle phase was found regarding skin resistance. This finding indicated that high MDS reporters were more likely to exhibit stress arousal indicated by skin resistance in the critical phase of the menstrual cycle than low MDS reporters (TABLE XII).

The results of the t-test regarding type-A behavior pattern indicated significant differences between high and low MDS reporters with the high symptom subjects reporting relatively more type-A behavior pattern (TABLE XIII).

The results of the t-test regarding locus of control indicated significant differences between high and low MDS reporters with high symptom subjects reporting more external locus of control than low symptom subjects (TABLE XIV).

The results of the t-test regarding trait anxiety indicated no significant differences between high and low MDS reporters (TABLE XV). However, two outliers prevented statistical significance.

Stress Arousal

It was an important aspect of this study to determine if stress arousal is a state phenomenon in its relationship to MDS covarying with the menstrual cycle or if stress arousal is a trait phenomenon showing consistent elevations in high symptom complainers. It would be expected that, if stress arousal and MDS were a state phenomenon and cyclically related, women with high MDS would manifest greater stress arousal during the critical phase when symptoms proliferate. However, if stress arousal is manifested in high symptom complainers without covarying with cycle phase, then noncyclical psychological processes, causing constant elevations of arousal, are suspect.

The results of the present study indicate that higher levels of stress arousal as measured by heart rate, respiration rate, and skin temperature were found in women reporting high MDS. Heart rates and respiration rates also showed higher levels of arousal in the critical phase of the menstrual cycle without regard to symptom complaint. The data regarding these parameters suggests, however, that high MDS complainers did not show elevations only during the critical phase but throughout the total menstrual cycle. The data also suggests that heart rate and respiration rate levels show arousal differences between cycle phases in the total sample but not exclusively in the high MDS reporters. These results regarding heart rate, respiration rate, and skin temperature imply that stress arousal is constant throughout the menstrual cycle for high symptom reporters.

The above findings implicate new perspectives in the relationship of stress arousal and menstrual distress symptomology. It is significant that these related cardiovascular parameters (heart rate, respiration rate, and skin temperature) all show stable elevations in women reporting high menstrual distress symptoms. This finding suggests the possibility that these cardiovascular

variables, all primarily dominated by the sympathetic nervous system, are intimately related to menstrual distress. It is also notable that, among these same parameters, skin temperature was the only one not subject to cyclical fluctuations in the nonstratified sample. This finding indicates the possibility that skin temperature is the cardiovascular parameter discriminating between high and low MDS reporters. This finding corroborates the theoretical premise that MDS is related to vascular control. A preliminary pilot study (Tubbs and Carnahan, 1976) has indicated that temperature biofeedback training has been successful in reducing MDS. According to this study, a cause and effect relationship cannot be established, but the presence of a relationship between MDS and skin temperature is suggested.

Other findings involving stress arousal indicate that high MDS reporters exhibit greater arousal during the critical phase than did low complainers as measured by levels of skin resistance. This relationship indicates that skin resistance levels covary with the menstrual cycle and that women with high MDS manifest greater stress levels during the critical phase when actual symptoms proliferate. This finding indicates a state phenomenon where skin resistance and menstrual distress symptoms covary. This fining is not inconsistent with the cardiovascular parameters. By its very nature, skin resistance is the most labile and reactive of the stress arousal parameters measured (reflected in its large standard deviation). This distinctive property lends itself to display even subtle differences in stress arousal. It would be expected that, if there were any relationship between the two factors, as demonstrated by the results of heart rate and respiration rate levels, skin resistance would be the most sensitive psychophysiological variable to reflect this relationship, as it appears to do in the present study.

Other results obtained from the present study show that stress arousal as measured by muscle tension did not exhibit any changes between the menstrual

cycle phases, nor were there any differences between high and low MDS reporters regarding muscle tension. This finding is inconsitent with the results of other stress arousal parameters measured in this study and also in theory based on previous studies of anxiety, the menstrual cycle, and MDS (Golub, 1977; May, 1976; Moos, 1969). In studies related to MDS and anxiety, most researchers found either phase-related differences in anxiety with higher levels in the critical phase or symptom-related anxiety with high symptom reporters reporting more anxiety throughout the cycle compared to low reporters. This present finding may have important implications regarding the self-report technique and levels of anxiety. It has been hypothesized that elevated anxiety levels show concomitant changes in muscle tension activity. Most research concerning MDS and anxiety utilizes self-report anxiety measures without psychophysiological data support. Parlee (1974) has indicated that self-reported measures of anxiety may be significantly inflated by symptom stereotyping or reporting what is perceived to be acceptable at the proper phase of the cycle through social conditioning. It would appear that the psychophysiological measure of muscle tension obtained in this study would be free from this bias which has caused validity problems in the past. Since no relationship between stress arousal as measured by muscle tension and MDS was found, it can be concluded that the notion of a stereotypic response may be an important consideration in the relationship of anxiety and MDS. Thus, there is a need for further research in this area.

To summarize the present findings regarding psychophysiological arousal, it is apparent that there is a definite relationship between MDS and levels of heart rate, respiration rate, skin temperature, and skin resistance. These findings imply that the cardiovascular system may be the target "organ system" in which general stress arousal manifests in the high symptom reporters, heightening symptom severity during the critical phases. The findings regarding these

measures are not only consistent with the literature but serve to theoretically connect the fragmented findings of previous researchers. Golub (1976) found a state phenomenon regarding anxiety in that subjects reported higher levels of anxiety during the critical menstrual cycle phase. The findings of the present study indicate that elevated levels of heart rate and respiration rate and lowered levels of skin resistance are experienced in the critical cycle phase. However, her study failed to stratify on symptom prevalence which failed to discriminate differences between high and low symptom complainers. The present study also found differences between high and low symptom complainers and, further, that high complainers exhibited elevated arousal levels of heart rate, respiration rate, and skin temperature not phasically but throughout the total cycle.

Moos (1969) and Coppen and Kessell (1963) found that self-reported anxiety tended to be higher in symptomatic women not only in the critical menstrual cycle phase but throughout the menstrual cycle. They both hypothesized that women with high MDS were neurotic and that their elevated anxiety levels were not caused by cyclical fluctuations but were caused by stable personality traits. The results of the present study regarding the cardiovascular psychophysiological measures support this theory. Elevations in these parameters were found to take place not only during the critical cycle phase but throughout the total cycle.

From the above results, it is evident that the two seemingly different theoretical explanations of stress arousal and MDS, which have been fragmented in the literature, have been placed into the same theoretical framework via the more sophisticated findings of the present study. According to the cardiovascular stress arousal measures, women, regardless of MDS symptom prevalence, experience a state phenomenon of elevated arousal in the critical menstrual cycle phase; however, in a population of high MDS prevalence, stress arousal elevations are

stable and not a function of the menstrual cycle phase. These constant elevations of stress arousal may serve to sensitize high MDS complainers to specific symptomology in the critical menstrual cycle phase.

The findings regarding stress arousal and stress-prone personality traits were consistent in their relationship to MDS. Further, this study identified a relative profile of high menstrual distress symptom reporters as compared to low reporters which included: more external locus of control; more type-A behavior pattern; stable levels of stress arousal as measured by skin temperature, heart rate, and respiration rate. In light of these findings, it can be concluded that the stress-prone personality traits exhibited by high MDS reporters were consistent with the stable elevations in stress arousal and may provide a basis for a more complete and comprehensive understanding of menstrual distress symptomology as a health problem.

TABLE I

SYMPTOM GROUPS ON THE MOOS MENSTRUAL DISTRESS QUESTIONNAIRE

PAIN

- General aches and pains
- Muscle stiffness
- Headache
- Cramps
- Backache
- Fatigue
- General aches

CONCENTRATION

- Insomnia
- Forgetfulness
- Confusion
- Lowered judgement
- Difficulty concentrating
- Distractible
- Accidents
- Lowered motor coordination

AUTONOMIC REACTIONS

- Dizziness, faintness
- Nausea, vomiting
- Hot flashes

WATER RETENTION

- Weight gain
- Skin disorders
- Painful breasts
- Swelling

NEGATIVE AFFECT

- Crying
- Loneliness
- Anxiety
- Restlessness
- Irritability
- Mood swings
- Depression
- Tension

AROUSAL

- Affectionate
- Orderliness
- Excitement
- Feelings of well-being
- Bursts of energy, activity

TABLE II

MENSTRUAL DISTRESS SYMPTOM SCORES

High Symptom Reporters		Low Symptom Reporters	
96	75	64	55
91	74	64	54
85	71	63	52
83	70	61	51
81	69	60	49
80	69	60	43
79	69	60	43
79	68	59	40
79	67	58	39
79	66	58	36
78	66	57	34
76	66	56	33
76	66		
Mean = 73.30		Mean = 50.79	
S.D. = 7.95		S.D. = 13.65	
n = 26		n = 24	

TABLE III

ANALYSIS OF VARIANCE WITH REPEATED MEASURES: BASELINE HEART RATE LEVELS
(beats/60 seconds)

Source	df	ss	ms	F
Symptom Report	1	1213.53	1213.53	6.48*
Within Cells	48	8985.60	187.20	
Cycle Phase	1	268.96	268.96	8.09*
Symptom x Cycle	1	115.62	115.62	3.48
Residual	48	1595.52	33.24	

*Significant at 0.05 level.

TABLE IV

MARGINAL MEANS AND STANDARD DEVIATIONS OF BASELINE HEART RATE LEVELS (beats/60 seconds) FOR CYCLE PHASE FACTOR

Phase	Mean	S.D.
Intermenstrual	72.840	10.499
Critical	76.120	11.526

TABLE V

MARGINAL MEANS AND STANDARD DEVIATIONS OF BASELINE HEART RATE LEVELS (beats/60 seconds) FOR SYMPTOM REPORT FACTOR

Symptom Report	Mean	S.D.
High	77.827	11.348
Low	70.854	9.673

TABLE VI

ANALYSIS OF VARIANCE WITH REPEATED MEASURES:
RESPIRATION RATE LEVELS
(cycles/60 seconds)

Source	df	ss	ms	F
Symptom Report	1	81.71	81.71	4.25*
Within Cells	48	922.65	19.22	
Cycle Phase	1	19.36	19.36	6.00*
Symptom x Cycle	1	12.81	12.81	3.97
Residual	48	155.04	3.23	

*Significant at 0.05 level.

TABLE VII

MARGINAL MEANS AND STANDARD DEVIATIONS OF BASELINE RESPIRATION RATE LEVELS (cycles/60 seconds) FOR CYCLE PHASE FACTOR

Phase	Mean	S.D.
Intermenstrual	17.480	3.553
Critical	18.360	3.361

TABLE VIII

MARGINAL MEANS AND STANDARD DEVIATIONS OF BASELINE RESPIRATION RATE LEVELS (cycles/60 seconds) FOR SYMPTOM REPORT FACTOR

Symptom Report	Mean	S.D.
High	18.788	3.220
Low	16.979	3.516

TABLE IX

ANALYSIS OF VARIANCE WITH REPEATED MEASURES:
BASELINE MUSCLE TENSION LEVELS
(μv/seconds, average)

Source	df	22	ms	F
Symptom Report	1	2.51	2.51	.81
Within Cells	48	148.10	3.09	
Cycle Phase	1	1.19	1.19	1.17
Symptom x Cycle	1	.83	.83	.81
Residual	48	48.77	1.02	

TABLE X

ANALYSIS OF VARIANCE WITH REPEATED MEASURES:
BASELINE SKIN TEMPERATURE LEVELS (°F)

Source	df	ss	ms	F
Symptom Report	1	644.45	644.45	10.92*
Within Cells	48	2831.89	59.00	
Cycle Phase	1	3.77	3.77	.09
Symptom x Cycle	1	.18	.18	.00
Residual	48	1906.48	39.72	

*Significant at 0.05 level.

TABLE XI

MARGINAL MEANS AND STANDARD DEVIATIONS OF BASELINE SKIN TEMPERATURE LEVELS (°F) FOR SYMPTOM REPORT FACTOR

Symptom Report	Mean	S.D.
High	84.279	7.332
Low	89.360	6.592

TABLE XII

ANALYSIS OF VARIANCE WITH REPEATED MEASURES: BASELINE - SKIN RESISTANCE LEVELS (kohms)

Source	df	ss	ms	F
Symptom Report	1	37.55	37.55	.11
Within Cells	48	15767.03	328.48	
Cycle Phase	1	77.28	77.28	.18
Symptom x Cycle	1	1870.00	1870.00	4.41*
Residual	48	20355.11	424.06	

*Significant at 0.05 level.

TABLE XIII

T-TEST: DIFFERENCES IN TYPE-A BEHAVIOR PATTERN BETWEEN HIGH AND LOW MENSTRUAL DISTRESS SYMPTOM REPORTERS

	High Symptom Report	Low Symptom Report
Mean	8.8077	6.9167
S.D.	3.1498	2.7492
S.E.M.	0.6177	0.5612
n	26	24

$t = 2.25$, $p < 0.029$ $df = 48$ Reject at 0.05 level

TABLE XIV

T-TEST: DIFFERENCE IN LOCUS OF CONTROL BETWEEN HIGH AND LOW MENSTRUAL DISTRESS SYMPTOM REPORTERS

	High Symptom Report	Low Symptom Report
Mean	12.6154	8.4583
S.D.	3.1379	4.3136
S.E.M.	0.6154	0.8805
n	26	24

$t = 3.92$, $p < 0.000$ $df = 48$ Reject at 0.05 level

TABLE XV

T-TEST: DIFFERENCES IN TRAIT ANXIETY
BETWEEN HIGH AND LOW MENSTRUAL
DISTRESS SYMPTOM REPORTERS

	High Symptom Report	Low Symptom Report
Mean	39.4231	34.5000
S.D.	11.0641	5.8755
S.E.M.	2.1698	1.1993
n	26	24

t = 1.94, p 0.058 df = 48 Accept at 0.05 level

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